

<p align="center"><b>LLNL Environmental Restoration Division Standard Operating Procedure</b></p>	<p align="center"><b>TITLE: Barcad Sampling</b></p>
<p><b>APPROVAL</b> _____ <b>Date</b> _____</p> <p><b>Environmental Chemistry and Biology Group Leader</b></p>	<p align="center"><b>PREPARER: E. Walter</b></p> <p align="center"><b>REVIEWERS: T. Carlsen and V. Dibley</b></p>
<p><b>APPROVAL</b> _____ <b>Date</b> _____</p> <p><b>Division Leader</b></p> <p><b>CONCURRENCE</b> _____ <b>Date</b> _____</p> <p><b>QA Implementation Coordinator</b></p>	<p align="center"><b>PROCEDURE NUMBER: ERD SOP-2.13</b></p> <p align="center"><b>REVISION: 2</b></p> <p align="center"><b>EFFECTIVE DATE: December 1, 1995</b></p> <p align="center"><b>Page 1 of 8</b></p>

## 1.0 PURPOSE

To define barcad sampling procedures that will ensure collection of a representative ground water sample.

## 2.0 APPLICABILITY

This procedure applies to the use of barcads for ground water sample collection. Barcads are generally used where it is desirable to install more than one discrete sampling device in multiple water bearing zones within a single borehole.

## 3.0 REFERENCES

- 3.1 Raber, E. and D. Carpenter (1983), *An Evaluation of the Hydrogeology and Ground Water Chemistry Associated with Landfills at LLNL's Site 300* (UCRL-53416).
- 3.2 Christofferson, E. and D. Ramsey (1992), "Procedures Manual for the Environmental Monitoring Section—EMP-GW-S, Ground Water Sampling."

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## **4.0 DEFINITIONS**

### **4.1 Barcad**

The Barcad system is a positive-displacement gas-drive sampler made of porous, chemically inert materials. High-purity nitrogen gas is used to displace the ground water and drive it to the surface for sample collection.

### **4.1 Volatile Organic Compounds (VOCs)**

A group of organic compounds characterized by their tendency to evaporate easily at room temperature. Some familiar substances containing VOCs are solvents, gasoline, paint thinners, and nail polish remover. Trichloroethylene, Dichloroethylene, Tetrachloroethylene, and Trichloroethane are all volatile organic compound (VOCs).

## **5.0 RESPONSIBILITIES**

### **5.1 Division Leader**

The Division Leader's responsibility is to ensure that all activities performed by ERD at the Livermore Site and Site 300 are performed safely and comply with all pertinent regulations and procedures, and provide the necessary equipment and resources to accomplish the tasks described in this procedure.

### **5.2 Field Personnel**

The field personnel are responsible for properly performing Barcad Sampling in compliance with all applicable regulations and procedures to insure the samples and data provided are representative of the actual conditions.

### **5.3 Sampling Coordinator (SC)**

The SC's responsibilities are to ensure that the field personnel have been properly trained, they comply with all applicable regulations and procedures, and supply a quarterly Barcad Sampling Schedule.

## **6.0 PROCEDURES**

### **6.1 Discussion**

Barcads are ordinarily set up as multiple completions, but usually—there is no more than two per borehole. They are used for sampling discrete water-bearing zones within the same or separate hydrologic unit(s) to determine the presence of contaminants. Technicians operating Barcads should have completed a lab course on pressure safety orientation prior to using compressed nitrogen gas.

Nine functional Barcads exist at Site 300 and are located in the East Firing Area (EFA). No equipment decontamination is necessary for Barcads. All equipment that comes in contact with the ground water is dedicated to each installation. Because the nitrogen gas

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comes in direct contact with the ground water, Barcads are not appropriate for the collection of VOC samples.

## **6.2 Office Preparation**

- A. Review the Site 300 Site Safety Plan and procedures specified in the appropriate SOPs.
- B. Coordinate schedules with the SC.
- C. Obtain a copy of the current Sampling Plan and appropriate logbook plus any necessary maps and fieldsheets from the SC.
- D. Check with the Site 300 Control Point Operator for access to the ERA, per SOP 4.1, "General Instructions for Field Personnel."
- E. Determine the number and type of sample bottles that will be needed. Identify local suppliers of sampling expendable (e.g., ice, plastic bags, gloves, etc.) as needed. Follow SOP 4.3, "Sample Container and Preservation."

## **6.3 Field Preparation**

- A. Assemble and load appropriate sampling containers and equipment into the sampling vehicle. See Attachment A for equipment checklist.
- B. Locate Barcads to be sampled, and choose the most efficient sampling order.
- C. Fill out initial information in Document Control Logbook per instructions in SOP 4.2, "Sample Control and Documentation."

## **6.4 Operation**

- A. Unlock the protective casing, and remove any dirt or debris from the lines and fittings with a clean disposable towel.
- B. Inspect the dedicated sample lines, gauges and the nitrogen cylinder for damage. Perform minor repairs as necessary and document them in the logbook .
- C. Check the pressure gauge on the nitrogen cylinder. If the gauge reads under 500 PSI, then it is considered insufficient pressure for sampling and the cylinder must be replaced. The nitrogen cylinder must be in an upright position and fixed to a stationary location.
- D. Turn the cylinder valve that opens the nitrogen cylinder to the gas line (refer to Attachment B of this SOP). Open the corresponding discharge valve to purge the line of the Barcad you are sampling, then close the discharge valve of the Barcad you are not sampling. Close the vent valve and open the pressure valve to pressurize the system. Water will soon begin to flow from the discharge line. When the water stops flowing, close the pressure valve and open the vent valve to depressurize the lines. The first purge cycle is now completed. Each discharge line must go through three complete purge cycles. Allow approximately 20 min between purges, although true

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recovery time may vary 2–20 min between installations. Note the date and times of purge cycles in the document control logbook. Once this has been completed, sampling can be performed on the fourth purge cycle. If bottles were partially filled during sampling, note the time and approximate amount in the Document Control Logbook (SOP 4.2) and repeat the purging process as often as necessary. If samples must be filtered, connect a disposable filter to the appropriate discharge line being purged. Follow the same sequence for sampling the second Barcad of the installation.

- E. When sampling is complete, turn the nitrogen cylinder valve to the “close” position. Depressurize the lines by turning all other valves to the “open” position. Close and lock the protective box.

## **6.5 Field Post Operation**

Cross-check the sample bottles with those recorded in the Document Control Logbook before leaving the sampling site. Store and handle samples per SOP 4.4, “Guide to the Handling, Packaging, and Shipping of Samples.”

## **6.6 Office Post Operation**

- A. Inventory sampling supplies and replace expendable items.
- B. Review field forms for completeness.
- C. Deliver original CoC form and logbooks to the Document Control Officer.
- D. Contact laboratory to notify them of shipment and quantity of samples. Ensure that instructions for sample analysis are clearly understood.

## **7.0 QUALITY ASSURANCE RECORDS**

- 8.1 Chain-of-Custody Form
- 8.2 Sampling Logbook
- 8.3 Ground Water Sampling Field Sheet

## **8.0 ATTACHMENTS**

Attachment A—Equipment Checklist

Attachment B—Barcad Completion

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# **Attachment A**

## **Equipment Checklist**

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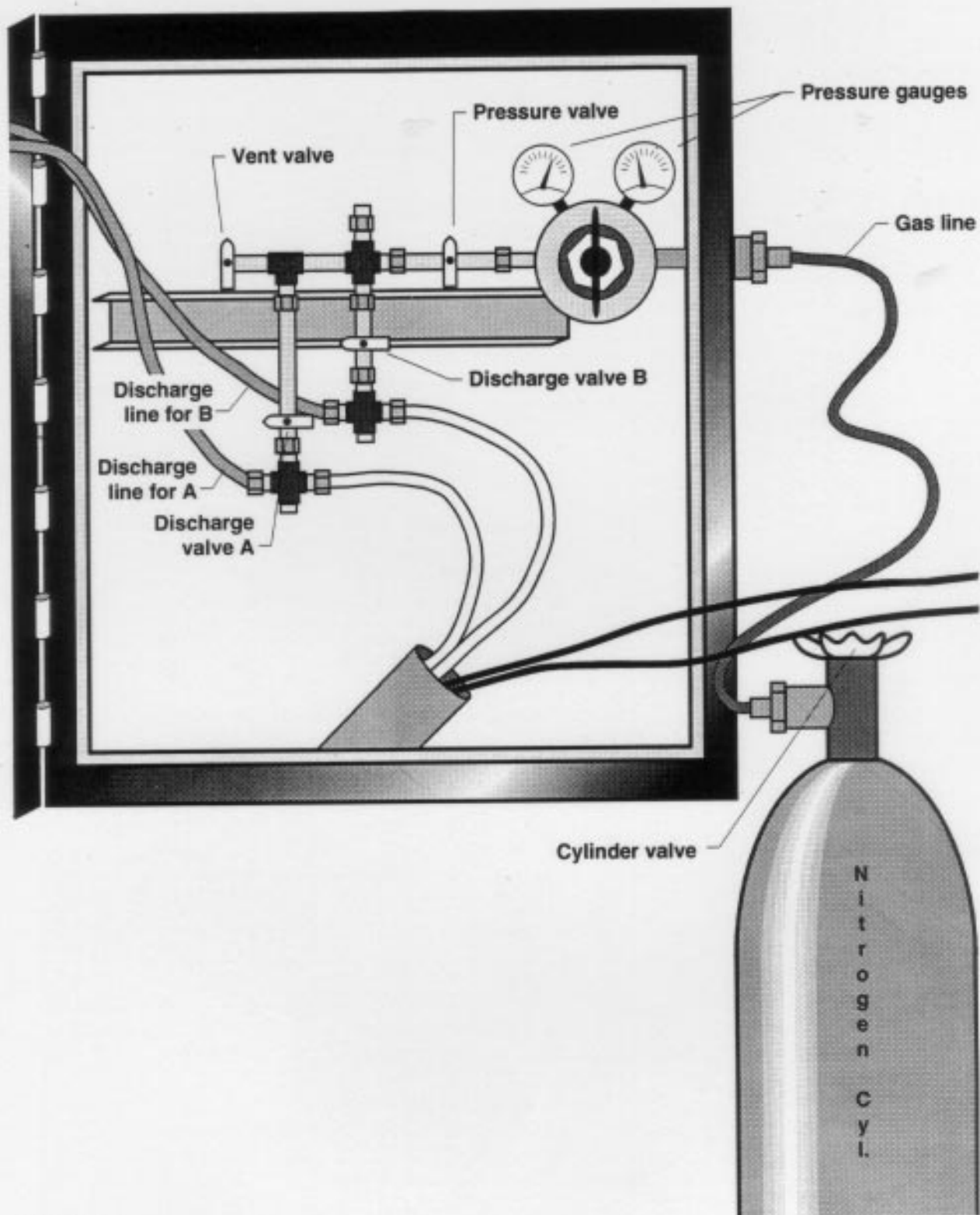
## Equipment Checklist

- \_\_\_\_\_ Two-way radio
- \_\_\_\_\_ Sample labels
- \_\_\_\_\_ Sample containers
- \_\_\_\_\_ Ice chests and blue ice
- \_\_\_\_\_ Document control logbook
- \_\_\_\_\_ CoC form
- \_\_\_\_\_ Field sheet
- \_\_\_\_\_ Disposable towels
- \_\_\_\_\_ Tool kit
- \_\_\_\_\_ Snake chaps (when necessary)
- \_\_\_\_\_ Vinyl gloves
- \_\_\_\_\_ Appropriate maps
- \_\_\_\_\_ Pencils/pens

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# **Attachment B**

## **Barcad Completion**



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Attachment B. Barcad completion showing details inside wellhead box.